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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : A23L 1/221, 1/227, 1/228, 1/229, 1/212	A1	(11) International Publication Number: WO 99/60868 (43) International Publication Date: 2 December 1999 (02.12.99)
(21) International Application Number: PCT/IL99/00273 (22) International Filing Date: 24 May 1999 (24.05.99) (30) Priority Data: 124660 27 May 1998 (27.05.98) IL (71) Applicant (for all designated States except US): LYCORED NATURAL PRODUCTS INDUSTRIES LTD. [IL/IL]; P.O. Box 320, 84102 Beer Sheva (IL). (72) Inventors; and (75) Inventors/Applicants (for US only): GEIFMAN, Arturo [IL/IL]; P.O. Box 1255, 44100 Kfar Saba (IL). HARTAL, Dov [IL/IL]; Ugarit Street 6, 69016 Tel Aviv (IL). (74) Agent: COHEN, A., David; P.O. Box 60, 84100 Beer Sheva (IL).	(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the</i> <i>claims and to be republished in the event of the receipt of</i> <i>amendments.</i>	
(54) Title: A CLEAR TOMATO CONCENTRATE AS A TASTE ENHANCER (57) Abstract The present invention relates to a taste enhancer comprising clear tomato concentrate. The present invention also relates to a method of enhancing the flavor of foods comprising adding a clear tomato concentrate to the food in an amount sufficient to enhance the flavor.		

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A CLEAR TOMATO CONCENTRATE AS A TASTE ENHANCER

FIELD OF THE INVENTION

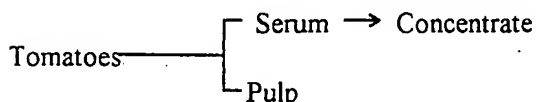
The present invention relates to a novel taste enhancer. The present invention more particularly relates to a natural taste enhancer having taste enhancing properties as good as if not better than commercially available taste enhancers without the problems associated with the popular taste enhancers, in use by the food industry.

BACKGROUND OF THE INVENTION

The food industry uses flavor enhancers in a variety of savory products. These enhancers consist of monosodium glutamate (hereinafter MSG), hydrolyzed vegetable proteins, disodium salts of the 5'-nucleotides inosine monophosphate (IMP), guanosine monophosphate (GMP) and adenosine monophosphate (AMP), as well as autolysed yeasts. While all have disadvantages, the major enhancer, MSG, suffers from the problem known as Chinese Restaurant Syndrome.

The literature on taste enhancers is very large. A sample reference cited to show the various taste enhancers known is: S. Fuke and Y. Ueda, "Interactions between umami and other flavor characteristics", in Trends in Food Science & Technology, Special Issue on Flavor Perception, December, 1996 (Vol. 7), Elsevier Sciences Ltd.

In the processing of tomatoes described in IL 107,999 w have obtained two fractions: serum and pulp where the serum is further concentrated:



After removing from the tomato juice the pulp, the serum is concentrated to a value that is higher than 4.5 ° Bx which is the normal value of crushed tomatoes to reach a Bx value of 80 Bx. It can then be hydrolyzed (or hydrolyzed and then concentrated). This product is commonly referred to as Clear Tomato Concentrate (CTC)-although it is clear only when it is in the 4.5 ° Bx region while at higher Bx values it becomes opaque.

OBJECTIVE OF THE INVENTION

The objective of the present invention is to afford a novel taste enhancer the Clear Tomato Concentrate which lacks the dominant tomato flavor to enable it to be used in a variety of savory food and beverage products and not only those based on tomatoes. It is a further objective of the present invention to afford a taste enhancer with little of no chance of causing Chinese Restaurant Syndrome.

STATEMENT OF THE INVENTION

A taste enhancer comprising clear tomato concentrate, and a method of enhancing the flavor of foods comprising adding a clear tomato concentrate to the food in an amount sufficient to enhance the flavor.

DETAILED DESCRIPTION OF THE INVENTION

Tomato Serum Concentrate contains 8-10% soluble proteins and free amino acids. By hydrolyzing the proteins, one can increase the concentration of free amino acids, and in this way intensify the flavor enhancing properties of the concentrate where the hydrolysis occurs due to the presence of natural tomato acids. The rate of hydrolysis increases by heating, and depends on the time and temperature. The results of acid hydrolysis of the Tomato Serum Concentrate are shown in Table 1.

The tomato proteins (in the concentrate or in the serum prior to concentration) can also be hydrolyzed by enzymes at relatively low temperatures.

For this we have used fungal, protease/peptidase enzyme formulation developed by Novo Nordisk, and sold under the name of "flavourzyme". Almost complete protein hydrolysis was obtained after one-hour enzyme treatment at 50 °. The enzyme was subsequently inactivated by heating at 80 ° for a short period. The results of enzymatic hydrolysis of the Tomato Serum Concentrate are shown in Table 2.

Hydrolysis before or after concentration of the Tomato Serum yields essentially the same results-namely an excellent food flavor enhancer.

A further embodiment of the invention is to use the flavor enhancer in powder form. Thus the Clear Tomato Concentrate, after the steps of hydrolysis and concentration, is either sprayed dried or dried using any other conventional dehydration techniques used by the food industry. The Clear Tomato Concentrate can be dried on a variety of materials such as maltodextrins, starches, sugars, carbohydrates, their derivatives or salts used as carriers to facilitate drying.

EXAMPLE 1 : Clear Tomato Concentrate In Powder Form

Clear Tomato Concentrate and maltodextrine 19 DE (dextrose equivalent) were diluted with water to the appropriate viscosity and sprayed dried to a free flowing powder containing 3 - 5 % moisture.

EXAMPLE 2 : Flavor Enhancing Properties Of Clear Tomato Concentrate

The food and flavor enhancing properties of the hydrolyzed and concentrated (in either order) Clear Tomato Concentrate are demonstrated in taste trials in which three different types of products (namely hamburger, Paolla rice, and vegetable soup) were prepared in three versions:

1. Control (with no flavor enhancers).
2. Product plus pure MSG (0.3% in the final product).
3. Product plus Clear Tomato Concentrate, 60° Bx (0.5% in end Product).

Fifteen tasters were asked to answer two questions for each product:

1. Which of the three samples is substantially different?
2. Which one of the remaining products do you prefer?

The results of the first question was as follows:

Hamburger: All 15 participants recognized the control as different and inferior.

Paolla Rice: All 15 participants recognized the control as different and inferior.

Vegetable Soup: All 15 participants recognized the control as different and inferior.

The results for the second question were as follows:

Hamburger: Three participants preferred the hamburger with MSG; 9 preferred the hamburger with the Clear Tomato Concentrate; and 3 had no preference.

Paolla Rice: One participant preferred the sample with MSG; 12 participants preferred the sample with Clear Tomato Concentrate; and 2 had no preference.

Vegetable Soup: Six participants preferred the soup with MSG; 5 participants preferred the sample with Clear Tomato Concentrate and 4 had no preference.

From this taste panel we see that the Clear Tomato Concentrate containing a total of 4-5% glutamic acid and glutamine is equal to or better than pure MSG with no problem of the Chinese Restaurant Syndrome. It is believed that this superior enhancing property is due to synergism between the glutamic acid and glutamine on the one hand and the various other amino acids present in the clear Tomato Concentrate on the other hand.

TABLE 1

CONCENTRATION OF FREE AMINO ACIDS IN TOMATO

SERUM (60° Bx) AFTER ACID HYDROLYSIS

<u>Compound</u>	<u>CONC. mg/kg</u>
Aspartic acid	11904.12
Threonine	1117.25
Serine	1279.80
Asparagine	5684.74
Glutamic acid	25501.90
Glutamine	12942.68
Proline	276.54
Glycine	280.20
Alanine	4574.41
Valine	440.16
Methionine	152.93
Isoleucine	531.46
Leucine	623.99
Tyrosine	419.01
Phenylalanine	1567.32
Gamma aminobutyric	9908.32
Ethanolamine	148.30
Tryptophane	16.56
Lysine	1010.62
Histidine	1035.93
Arginine	<u>905.63</u>
Total	80321.87

TABLE 2

CONCENTRATION OF FREE AMINO ACIDS IN TOMATO

SERUM (60° Bx) AFTER ENZYMATIC HYDROLYSIS

<u>Compound</u>	<u>CONC. mg/kg</u>
Aspartic acid	12393.07
Threonine	1186.59
Serine	1370.29
Asparagine	4565.77
Glutamic acid	25547.74
Glutamine	11454.92
Proline	280.31
Glycine	332.54
Alanine	4570.03
Valine	488.21
Methionine	156.60
Isoleucine	522.86
Leucine	612.15
Tyrosine	435.35
Phenylalanine	1598.48
Gamma aminobutyric	10271.85
Ethanolamine	167.84
Tryptophane	26.97
Lysine	1058.58
Histidine	1051.20
Arginine	<u>925.63</u>
Total	79016.99

CLAIMS

1. A clear tomato concentrate for use as a taste enhancer.
2. A clear tomato concentrate in accordance with Claim 1 wherein the clear tomato concentrate is obtained by separating the serum from tomato juice and concentrating it.
3. A clear tomato concentrate in accordance with any of Claims 1 or 2, wherein the serum is concentrated to Bx values of 8 to 80.
4. A clear tomato concentrate in accordance with any of Claims 1 or 2, wherein the serum is concentrated to Bx values of 8 to 60.
5. A clear tomato concentrate in accordance with any of Claims 1 to 4, containing 0.5% to 20% free amino acids.
6. A clear tomato concentrate in accordance with Claim 5 containing 4% to 15% free amino acids.
7. A clear tomato concentrate in accordance with Claim 5 containing 8% to 10% free amino acids.
8. A clear tomato concentrate in accordance with any of Claims 1 to 7 wherein the clear tomato concentrate is hydrolyzed.
9. A clear tomato concentrate in accordance with Claim 8 wherein the serum is hydrolyzed and then concentrated.
10. A clear tomato concentrate in accordance with Claim 8 wherein the serum is concentrated and then hydrolyzed.
11. A clear tomato concentrate in accordance with any of Claims 1 to 10 wherein the hydrolysis is carried out using heat and the natural acid present in the concentrate or serum.
12. A clear tomato concentrate in accordance with Claims 1 to 10 wherein the hydrolysis is carried out via protolytic enzymes.

13. A clear tomato concentrate in accordance with any of Claims 1 to 12 wherein the clear tomato concentrate has very little tomato flavor compared with tomato concentrate.
14. A clear tomato concentrate in accordance with any of Claims 1 to 13 wherein the clear tomato concentrate is in the form of a powder .
15. A clear tomato concentrate in accordance with any of Claims 1 to 14 wherein the clear tomato concentrate is sprayed dried on a suitable carrier.
16. A clear tomato concentrate in accordance with Claims 14 or 15 wherein the carrier is selected from the group consisting of maltodextrins, starch, starch derivatives sugars, corn syrup solids, gums, salts and mixtures thereof.
17. A method of enhancing the flavor of foods comprising adding a clear tomato concentrate to the food in sufficient quantity to enhance the flavor of the food.
18. A method of enhancing the flavor of foods comprising adding a clear tomato concentrate in combination with another suitable flavor enhancer or mixtures thereof in sufficient quantity to enhance the flavor of the food.
19. A method of enhancing the flavor of foods in accordance with Claim 18 wherein the additional flavor enhancer is selected from monosodium glutamate (MSG), hydrolyzed vegetable proteins, disodium salts of the 5'-nucleotides inosine monophosphate (IMP), guanosine monophosphate (GMP) and adenosine monophosphate (AMP) and autolysed yeasts
20. A method in accordance with Claim 17 wherein the taste enhancer contains 0.5% to 20% free amino acids.
21. A method in accordance with Claim 20 wherein the taste enhancer contains 4% to 15% free amino acids.
22. A method in accordance with Claim 20 wherein the taste enhancer contains 8% to 10% free amino acids.

23. A method in accordance with any of Claims 17 to 22 wherein the clear tomato concentrate is hydrolyzed.
24. A method in accordance with Claim 23 wherein the serum is hydrolyzed and then concentrated.
25. A method in accordance with Claim 23 wherein the serum is concentrated and then hydrolyzed.
26. A method in accordance with any of Claims 17 to 25 wherein the hydrolysis is carried out using the natural acid present in the concentrate serum and heat.
27. A method in accordance with any of Claims 17 to 25 wherein the hydrolysis is carried out via protolytic enzymes.
28. A method in accordance with any of Claims 17 to 25 wherein the flavor enhancer has very little tomato flavor compared with tomato concentrate.
29. A method in accordance with any of Claims 17 to 28 wherein the clear tomato concentrate is in the form of a powder.
30. A method in accordance with any of Claims 17 to 29 wherein the clear tomato concentrate is spray dried on a suitable carrier.
31. A method in accordance with any of Claims 17 to 29 wherein the carrier is selected from the group consisting of maltodextrins, starch, starch derivatives, sugar, corn syrup solids, gums, salts and mixtures thereof.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/IL 99/00273

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A23L1/221 A23L1/227 A23L1/228 A23L1/229 A23L1/212

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

29 October 1999

Date of mailing of the international search report

08/11/1999

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>DATABASE WPI Section Ch, Week 198428 Derwent Publications Ltd., London, GB; Class D13, AN 1984-173912 XP002120578 & JP 59 095870 A (DAINIHOH SHIGYO KK), 2 June 1984 (1984-06-02) abstract</p> <p>---</p>	1,2,13, 17,18
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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